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investigations obtained surprisingly rich zoological results. The deepest sounding was taken between the Tortugas and the northeast cape of Yucatan (Cape Catoche) and was 1,920 fathoms; the next deepest being 1,568, north of the same. All depths of water of about 600 fathoms and upwards gave a uniform temperature of 39.5° Fahrenheit.

A correspondent of the New York *Tribune* gives an account of the results of a recent careful survey of Newfoundland under the superintendence of a Geological Commission. The area of the island is now found to be 42,000 square miles. It is 317 miles in length and 316 miles in breadth. It is, therefore, the tenth largest island in the world, and contains 10,000 square miles more than Ireland. Nor is there to be found an equal area with such an extent of coast line as Newfoundland, which, according to the Surveyor's report, cannot be less than 2,000 miles in length.

Prof. F. V. Hayden, in charge of the U. S. Geological Survey of the Territories, has recently been elected foreign member of the Royal Academy of Sciences, Letters and Arts, of Palermo, Sicily.

The English Palestine Exploration Fund has successfully accomplished the survey they began, in 1872, of all Palestine west of the Jordan. The scientific results of this survey are to be made public in a series of memoirs. The map is to be on the scale of one inch to a mile. The portion east of the river was assigned to the American Expedition, and is not yet completed.

MICROSCOPY.[1]

National Microscopical Congress (*Continued*).—Dr. R. H. Ward spoke at some length in regard to "Recent Progress in Microscopic Ruling," referring chiefly to the recent work of Mr. Charles Fasoldt, of Albany, and of Professor Wm. A. Rogers, of Cambridge. Mr. Fasoldt's experiments in ruling commenced during the middle of last winter, and must be regarded as remarkable considering the fact that he was entirely unfamiliar with the microscope and its use, and knew nothing of what had been done or could be done in microscopic ruling. Being a manufacturer of chronometers, he possessed the advantage of great skill in small mechanical operations and some experience in handling gems. He first, at the casual suggestion of a friend, undertook to make circular rulings, described with a common lathe and spaced with the slide-rest; and in this manner produced fair concentric circles as close as $\frac{1}{5000}$ of an inch. Parallel straight lines of equal closeness, but not of equal excellence, were then made on the same lathe, both the spacing and the ruling being accomplished by the motions of the slide-rest. Dissatisfied with this result, a screw machine was extemporized, and much closer lines of much better quality were produced. Some of the bands ruled with this little screw were better than many of the commercial micrometers, though not to be compared with the work of Nobert or of Rogers. The screw was then abandoned, and the machine prepared with which the present work is done. Unfortunately, the maker is unwilling to give further information about this machine than that it has other than a screw motion, intimating, perhaps, that the spacing is accomplished by a lever movement. The finest bands are ostensibly ruled to $\frac{1}{120000}$ inch,[1] but it may be considered doubtful whether they are ruled according to the reading of the machine that made them. The bands up to $\frac{1}{60000}$ inch have been reported correct by authority that ought to be competent to judge, and the whole series is worthy of careful study by those who are expert in such work. Of a very different class is the progress made by Professor Rogers during the past year. The stage micrometers hitherto used as a basis of micrometry have scarcely claimed to possess a definite degree of accuracy. The speaker had used for years a standard obtained by comparing about two hundred micrometers ruled in different parts of the world, rejecting the few that from their wide deviation from the average were presumably erroneous, and averaging the remainder. Probably such a standard, though unsatisfactory, because of uncertain value, was as nearly safe as anything heretofore attainable. To obviate this uncertainty, Professor Rogers determined to derive a standard inch, with a precision not known to have been obtained before, from "Bronze bar No. 11," which has been the authorized standard in this country since 1855, having been presented to the United States by the British Government as one of the five original duplicates of "Bronze 19" the only English standard since the "standard yard of 1760" was destroyed by fire, and to derive a standard centimetre from the iron bar now in possession of the United States Coast Survey, one of the original standard metres, and the best representative in this country of the platinum metre deposited in the Archives of Paris. He fitted a glass bar forty-two inches long, one inch wide and one and a quarter inches thick, into an iron frame, the surfaces being made as true a plane as possible. With a diamond in a graduating engine he laid off upon it one hundred centimetre divisions. He then took the bar to Washington where the said lines were compared with the standard metre, and where the British yard and the Archives metre were transferred from the Saxton comparator of the United States Coast Survey to both the glass bar and its iron frame. The errors of the subdivisions of the yard, and of the metre, were investigated by means of a comparator constructed for the purpose of subdividing any unit into equal parts. The corrections for each subdivision having been determined, a number of copies of that division as corrected are ruled, and the one selected which corresponds most nearly with the computed correction. A similar process is applied to each subdivision, and finally these subdivisions are compared among themselves, and the one selected which is nearest the mean of the whole number. Thus the $\frac{1}{36}$ of a standard yard, and the $\frac{1}{100}$ of a standard metre, have been obtained with a certainty not believed to have been secured before. The standard centimetre thus produced by Prof. Rogers was submitted to the Congress for the use of members who might desire to determine the value of the divisions of their micrometers in terms of the Coast Survey standard.

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[1] This department is edited by Dr. R. H. Ward, Troy, N. Y.

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[1] Mr. Fasoldt's finest lines are now made in twelve-band plates, the lines of the lowest band being 1–10,000 of an inch apart, of the next band 1–20,000 inch, of the next 1–30,000, and so on, increasing 10,000 to the inch each time to the twelfth band, which, if successfully ruled, has lines spaced to 1–120,000 inch. These plates can be made at as low a price as $15.00.

Prof. J. D. Hyatt, of New York, gave a very interesting address on "The Sting of the Honey-bee," illustrated by a large number of diagrams. His paper, with its illustrations, will be published in the forthcoming number of the new quarterly.

"On the Construction of Oculars," by Wm. H. Seaman, of Washington. The discrepancies in published statements in regard to oculars, led the author to make a full series of measurements of the parts of eighteen oculars by English and Continental makers, and to present the results in a tabular form. By inspecting the table it appears that the common ratio between the focal lengths of eye lens and field lens is $\frac{1}{2}$, in one instance it is $\frac{1}{3}$, and in one of older construction $\frac{7}{9}$. The only general principle in regard to the interval separating the lenses is, that it shall be less than the solar focus of the field lens; and when in the deeper oculars, and those which are orthoscopic, it seems to exceed this limit, it must be remembered that in connection with the objective the ocular receives diverging rays, and for such, its focus is beyond the solar focus. It may also be noticed that but a small part of the diameter of the eye lens is actually used in the lower powers.

Prof. J. E. Smith made some remarks on "Micrometer Rulings," repeating his claim, formerly published, as the first to have resolved Nobert's 19th band, by reflected light. He also expressed the belief that he had resolved by reflected though not by transmitted light bands of $\frac{1}{120000}$th inch ruled, or attempted to be ruled, by Rogers.

"A New Turn-table" was exhibited and described by John W. Sidle, of Philadelphia. This table is self-centering by the Cox method, having jaws that press diagonally toward the center of the slide. Instead of the screw movement of the original form, or the lever or scroll screw of later modifications, the jaws are mounted near the edges of two small circular discs which are set into the main plate or table, on opposite sides of the center, and which by revolving simultaneously change the distance of the jaws from the center of the table. The mechanism seemed unlikely to get out of order, and a very steady and prompt motion was attained.

Prof. William Lighton, of Ottumwa, Iowa, described a "New Arrangement for Dark-field Illumination," in which an effect comparable to that of a spot-lens was produced by placing above the eye-piece a diaphragm with an aperture of $\frac{1}{20}$ inch, decentered so as to cut off the central cone of light ordinarily used by the eye. This effect is produced most perfectly with an achromatic eye-piece. He also described "An Analyzing Eye-piece," containing a bundle of reflecting plates arranged at a polarizing angle.

Dr. R. H. Ward gave an account of recent improvements in "Biscoe's Section Cutter." The principles of construction of this machine, which is said to have been founded on some German inventions, were fully explained in the NATURALIST for Jan., 1874. As now made by Mr. L. Schrauer, of New York, it has a central cylinder and plunger like other section cutters. In this way the object to be cut is arranged with great facility, while the thickness of the sections is regulated with ease and precision by the screws that support the carriage. This arrangement has a capacity for easy and good work that is almost incredible to persons accustomed to use other contrivances.

A communication on "Seiler's Section Cutter," by Wm. H. Walmsley, was read by title in the absence of its author.

A paper on "Epithelium" was read by Dr. W. H. Atkinson, of New York.

After referring the question of publishing proceedings to the executive committee, and passing an appropriate vote of thanks for favors received at Indianapolis, the Society adjourned until the Buffalo meeting.

NEW FORMS OF MOUNTING.—The cement which is essential to these processes, and which I regard as the most important working material of the microscopist, is shellac varnish prepared in the following simple manner: The white purified gum shellac is dissolved in alcohol and filtered through cotton one or more times until it is quite clear and transparent. As the filtering is to most persons a somewhat difficult operation, they had better perhaps let the druggist make this preparation for them. With this cement I build up a cell as deep and perhaps as quickly as one can be made with a curtain ring, painted up as it usually is. As much as one or two drops can be put on a slide with a brush, using the turn-table, and then slowly worked up into a narrow ring with the point of a small knife-blade held on the turning slide. When this has dried a day or two, another layer can be put on and worked up in the same way. Three or four such layers will be sufficient for almost any cell, and it can then be dried in the heating oven and laid aside for future use.

By carrying along a dozen or two slides at once, one will find great economy both of time and labor. These rings being transparent are admirably adapted for opaque mountings, with which it is desired to use the Lieberkühn.

If common curtain rings are fastened to slides with shellac cement, colored with aniline blue, the joined edges of the brass film of which the ring is made being on the glass, and then subjected to a slowly increasing heat until the cement begins to burn, a very beautiful ornamentation is given to the under side of the ring, a circle of minute golden links making their appearance there. These rings can then be painted according to fancy on the turn-table and used for any kind of mounting.

I use this cement, colored with the various aniline dyes which are soluble in alcohol, for painting and finishing slides. These colors are far superior, for all purposes of ornamentation, to any other material or devices for painting; they dry quickly and adhere to glass with greater tenacity than any other cements that I have ever used.

For a cell that will perfectly withstand the action of Canada balsam or turpentine, I make use of the shellac cement colored with aniline blue, in the following manner: After a cell of the required depth is made on the slide and pretty thoroughly dried in the usual way, it is heated on the heating table, slightly at first in order to avoid bubbles, then gradually increasing the heat until the cement commences to smoke and the color to burn out. By heating one side of the ring a very little more than the other, as may be done over an alcohol lamp, a part may be left blue while the other is yellow or reddish, which has a very pretty effect under Canada balsam. These cells are hard as bone, and can scarcely be cut from the glass. Balsam has no effect whatever on them. Mountings on them may be finished off with liquid balsam, made true and circular with the point of a knife on the turn-table. In a few days, or in a shorter time by using the oven, they will be ready to clean and lay away. The cells which I have described are the only cement cells that can be used with Canada balsam. They are particularly adapted to vegetable stainings, algæ, and all other preparations either too thick or too tender to be mounted in balsam without something to sustain the thin glass covers.

In opaque mountings when cements of any kind are used, either for back-ground or to hold the object in place, I have found it highly advantageous to leave on, or in the lower part of the ring, a minute aperture opening into the cell, not necessarily larger than a cambric needle would make. With this provision both the cell and the cement go on drying, and there is no sinking in or moving about of the objects in the medium which holds them. If the cell be hermetically closed, one may expect that the object will, sooner or later, be overwhelmed in a black sea. If curtain rings are used, a little notch can be filed in the side of them, and this be left open when the slide is finished.

If the opaque mountings are for dry objects, I make in the center of the ring a disk of Brunswick black or white zinc, according as the object to be shown is white or black. It may be $\frac{5}{16}$ of an inch in diameter for the Lieberkühn of the $1\frac{1}{2}$ inch objective, but not over $\frac{1}{4}$ inch for that of the $\frac{2}{3}$ objective. After the cement is dry and quite hard, a thin coat of balsam is spread over it and the objects placed in this and arranged if necessary under the microscope. The slide is then set aside to dry and may safely be covered the next day. If the object to be mounted will bear immersion in balsam, as some shells, seeds, minerals, etc., I pursue the following plan: The thin glass covers are cemented to some old slips, kept for the purpose, by two or three touches or the balsam applied to the edge of the cover, care being taken to center the cover on the slip by means of the self centering turn-table. The objects are then arranged on a light coating of balsam on the center of the cover. When quite dry they should be completely covered by balsam and thoroughly hardened in the drying oven. Then Brunswick black or white zinc may be spread over the object, in thin layers at first, each being dried in the open air for a day before putting on the next, until an opaque covering is made for the object. Thoroughly clean the cover around the objects and then remove it from the slip by a slight heating. Then turn it over and mount it upon the cell prepared for it. Fasten the cover to the cell with gelatine softened by water to the consistency of jelly and then liquified by alcohol. Put the cover on the cell and apply the gelatine solution with a brush around the edge, leaving the little opening before referred to. When dry the cell may be finished with liquid balsam, carefully avoiding the little aperture. The outer edge may be gathered up into a neat trim circle with the point of a knife on the turn-table. —*C. C. Merriman, Rochester, New York.* (*Read at the National Microscopical Congress at Indianapolis, August,* 1878.)

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SCIENTIFIC NEWS.

— British Association for the Advancement of Science. We conclude our account of the last meeting, which was, on the whole, one of the largest, most varied and pleasant that has been held for twenty years. Several of our American scientists read papers. Prof. T. Sterry Hunt made communications on the Metamorphic or Archæan rocks of America as compared with those of Great Britain, and also on the geological relations of the atmosphere. Prof. E. D. Cope read papers on the Saurians of the Dakota formation of the Rocky mountains, and on the Vertebrata of the Permian formation of Texas. Mr. Graham Bell made a communication on the Telephone. Prof. Cook, State-geologist of New Jersey, was also present. Of the papers of special interest, we note one in the zoölogical section by Sir Victor Brooke on the deer; a good point he made was the existence of a constant variation in the horn of *Cervus dama*, which